

that taking the State or section as a whole the maximum and minimum occurring within it and the general range for the section might be comparable with similar numbers for other sections, and that thus we might study the relative climatology of the different sections, but this has not yet been done to any great extent. We can take the average of the departures of all the stations from their respective normals, and thus obtain an average departure for the whole section, but even this has no value in climatology when the stations have a wide range in altitude, latitude, or longitude. The study of climatology is coming down more and more into details, and these so-called absolute maxima and minima by sections cover up the very details that we wish to study.

Finally we note "The absolute maximum of 95° was, with two exceptions, the lowest of record for the month, while the absolute minimum was the highest with one exception". We think that the writer was endeavoring to communicate something that had impressed him as peculiar and perhaps remarkable, as to the weather in his section during September, 1906, but we do not ourselves get any clear idea from this paragraph and we think it should be rewritten, omitting the word "absolute", and mentioning the names of the stations.—*C. A.*

ADAM PAULSEN (1833-1907).

Prof. Adam F. W. Paulsen, director of the Danish Meteorological Institute—the national weather service of Denmark—died January 11, 1907, at the age of 74.

In addition to his many other activities as the head of the Danish meteorological service and as a member of the International Meteorological Committee, Professor Paulsen was especially interested in two important projects—the study of the aurora, and the establishment of telegraphic communication between Europe and Iceland, for meteorological purposes. The cable to Iceland became an accomplished fact shortly before his death, and is a lasting monument to his memory. The discouraging financial difficulties that he had to overcome in achieving this result have been set forth in his reports to the International Meteorological Committee.

Paulsen's investigations of the aurora date from the international polar expeditions of 1882-1883, in which he took part as leader of the Danish expedition to the west coast of Greenland. In 1899-1900 he led an expedition to northern Iceland for the special purpose of studying the aurora. The results of the latter expedition included some remarkable photographs of auroral spectra, and new measurements of the altitude of the rayless auroral arch, indicating that it occurred at not less than four or five hundred kilometers from the earth's surface. At this height the atmosphere must be so rarified that ordinary electrical discharges would be impossible. In a paper¹ published a few months before his death Paulsen reaches the conclusion that the cause of the aurora is to be sought in an immense ionization and negative electrification of the upper layers of the atmosphere, produced by cathode rays emitted from the sun.

Professor Paulsen's successor as director of the Meteorological Institute is Capt. Carl Ryder, who has heretofore been known to science chiefly as an arctic explorer.—*C. F. T.*

WEATHER BUREAU MEN AS EDUCATORS.

The following lectures and addresses by Weather Bureau men have been reported:

Mr. S. S. Bassler, March 5, 1907, before the Cincinnati Society of Natural History, on "The weather map".

Mr. Ford A. Carpenter, March 9, 1907, before the Scholia

Club, of San Diego, Cal., on "What makes the climate of San Diego"?

Mr. George M. Chappel, March 20, 1907, before the teachers and pupils of the North High School, Des Moines, Iowa, on "The work of the Weather Bureau".

Mr. David Cuthbertson, March 27, 1907, before the West Side Business Men's Association, of Buffalo, N. Y., on "The usefulness of the Weather Bureau to the commercial interests".

Mr. C. F. von Herrmann, March 23, 1907, before the Alpha Delta Epsilon Scientific Fraternity, of Johns Hopkins University, Baltimore, Md., on "The principles of forecasting the weather".

Mr. J. R. Weeks, March 18, 1907, before pupils of the Washington Street Public School, Binghamton, N. Y.; also March 21, before the successful scholarship contestants of the Binghamton Republican, on "The work of the Weather Bureau".

Classes from universities, academies, and schools have visited Weather Bureau offices, to study the instruments and equipment and receive informal instruction, as reported from the following offices:

Meridian, Miss., March 14, 1907, the physics class from Moffat-McLaurin Institute.

Mobile, Ala., March 22, 1907, a section of the physical geography class from Barton Academy.

Salt Lake City, Utah, during March, 1907, students from the Salt Lake High School and the Latter Day Saints' University.

BELLS AS BAROMETERS.

We find a misleading paragraph under the above heading going the rounds of the press to the effect that "about five miles from Lebekke, in Belgium, there are some small church bells known as the 'water bells'. When they are heard distinctly in the town rain is sure to follow". With this paragraph goes a so-called "plausible popular explanation of the phenomenon", about as follows:

"If bells sound very distinctly of an evening, this points to the probability of a wet day following, since air heavily charged with moisture conducts sound better than dry air. So, too, as dense air conducts better than light air, bells sound more clearly when the barometer is high than when it is low, other things being equal; and so, too, with hot and cold air".

There are several errors in this explanation. It may be acceptable to teachers and others if we add that the intensity and quality of a sound depends primarily on the bell, and the tower in which it is hung, but only to an infinitesimal degree, if at all, on the temperature of the air, or the quantity of aqueous vapor contained therein, or on the relative humidity of the air. On the other hand the intensity of sound, observed at a distance, does depend to a very large extent on the homogeneity of the air, while the distance to which a sound is heard depends on the direction of the wind. If the air is perfectly homogeneous then the effect of a horizontal wind, which is usually feeble near the ground and strong higher up, is to bend the rays of sound out of their straight line directions. If the observer is to windward of the bell, the sound that should come to him passes over his head, and if he is to leeward the sound that should pass over his head is brought down to him. If he is to leeward of a house or island the irregularities of the wind may bend the sound wave entirely away from him. If he is in a calm stratum, as in the early morning, with the wind blowing strong above him, then he may hear no sound if he is to windward of the bell, but a more intense sound if he is to leeward. Ordinarily the air is not homogeneous, but is a mixture of warm and cold, or dry and moist masses, that is to say, a mixture of rarer and denser portions that break up waves of sound. Especially during hot sunshine does the air become acoustically opaque, that is

¹Sur les récentes théories de l'aurore polaire. Résumé et critique des théories de MM. Birkeland, Arrhenius et Nordmann. Idées personnelles. (Académie royale des sciences et des lettres de Danemark. Extrait du bulletin de l'année, 1906. No. 2.)